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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/973,854	10/09/2001	Dinesh Chopra	MICRON.183A	7148

20995 7590 09/10/2003

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EXAMINER

MACARTHUR, SYLVIA

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 09/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<p align="center">Office Action Summary</p>	Application No. 09/973,854	Applicant(s) CHOPRA ET AL.	
	Examiner Sylvia R MacArthur	Art Unit 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Priod for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) 22-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>2/11/02</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-21, drawn to a system for performing CMP, classified in class 156, subclass 345.12.
 - II. Claims 22-27, drawn to a method for cleaning a CMP pad, classified in class 134, subclass 57.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case, the process could have been practiced by another materially different apparatus such as one without a carriage.
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.
4. During a telephone conversation with Michael Trenholm on 9/4/2003 a provisional election was made without traverse to prosecute the invention of the apparatus, claims 1-21. Affirmation of this election must be made by applicant in replying to this Office action. Claims 22-27 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Ali et al in *Pad Conditioning in Interlayer Dielectric CMP*.

Regarding claim 1: Ali et al teaches a dual head (one head is carriage, the other comprises the cleaning pad) CMP apparatus. The apparatus further includes a pad, supply of fumed silica slurry. The pads were cleaned with DI water. The extractables (spent cleaning solution) were analyzed by FTIR, see pages 1 and 2.

Regarding claims 2-4: The apparatus by Ali et al is inherently capable of removing metal from a device. It is further capable of removing such metals as copper. These limitations are intended use limitation and are not given patentable weight. Note the type of material removed from the device does not further limit the structure of the apparatus of Ali et al.

Regarding claims 5 and 6: Ali teaches the pad conditioning is performed with a diamond disk, see page 3.

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Regarding claim 7: The cleaning solution of Ali is capable of removing the copper oxides from the CMP pad. This is intended use.

Regarding claims 8-10: The apparatus of Ali is inherently capable of using ammonium citrate or nitric acid. The actual type of cleaning solution is a matter of intended use.

Regarding claims 11-13: The analysis of the cleaning solution in Ali comprises a Fourier transform infrared (FTIR) spectrometer, a plan microscope, gas chromatograph, ion chromatograph, flame atomic absorption spectrometer and an ICP analyzer. This system comprises an optical and chemical analyzing system. The apparatus discussed further comprises a light source and a light detector. All comprise a light source and a light detector. The data gathered from these analysis tools produce the refraction and absorption of the light and is used to determine the concentration of ions in the cleaning solution.

Regarding claims 14 and 15: The analysis performed by the apparatus of Ali is capable of detecting the concentration of copper ions and the concentration of contaminants.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 16-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ali et al in view of Chopra et al in *An Optical Method for Monitoring Metal Contamination during Aqueous Processing of Silicon Wafers*.

The teachings of Ali et al were discussed above. Recall Ali et al teaches a chemical analyzing system for the cleaning solution. Recall the FTIR coupled with a plan microscope are able to provide the microspot IR identification of the extractables. Page 3 of Ali notes that further analysis for ionic contamination can be done using an ion chromatograph for anion analysis and a flame atomic absorption spectrometer and an inductive coupled plasma analyzer for cation analysis.

Ali does not teach that this analysis is in-situ as claim 16 suggests.

Chopra et al teaches an optical technique for monitoring metal contamination in aqueous processing of wafers. The monitoring apparatus used by Chopra includes an optical and chemical analyzing system. A light source (HeNe laser) projects a beam of light into the cleaning solution flow after the cleaning solution has been introduced onto the CMP pad during and after the mechanical abrasion. A detector (PDA) receives the light from the light source, and a controller is inherently provided to receive the signals from the detector. Page 1689 discusses that the signals from the detector comprise a change in the location and a change in the intensity of the detected beam of light. The change in location/intensity of the detected beams is caused by a change in refraction/absorption and thus caused by a change in concentration of the contaminants. This is the essence of spectroscopy. See the discussion in paragraph 2 and 3.

The motivation to utilize the analysis system of Chopra in the apparatus of Ali is that Chopra's analysis is in situ measurements. The advantages are less contamination of the sample and analysis done in real time.

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Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the apparatus of Ali to comprise in situ measurements of the cleaning solution, which are done faster and during processing of the substrate.


Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R MacArthur whose telephone number is 703-306-5690. The examiner can normally be reached on M-F during the core hours of 8 a.m. and 2 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Sylvia R MacArthur
Patent Examiner
Art Unit 1763


September 8, 2003